Biosciences, Biotechnology Research Asia Vol. **5**(2), 647-649 (2008)

The presence and control of *Salmonella* in food stuffs

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(Received: July 16, 2008; Accepted: October 22, 2008)

ABSTRACT

Salmonella can live in the GI tract of many animals and can be transmitted to soil, water, foods and other animals via feces. *Salmonella* is one of the important causes of food poisoning all over the world, most commonly in raw meat (poultry, cattle, pig and sheep), raw egg, raw milk, contaminated fruit and vegetables, contaminated water, fish and shellfish. The goal of this study is to investigate the presence of *Salmonella* in raw meats and to propose different methods for controlling it. In 2006, 63 raw meat samples (24 red meats, 18 chopped chickens, 19 ground meats and 2 poultry pastes) were tested for *Salmonella*. For this purpose, at first 25 grams of each sample was enriched at two steps, pre-enrichment and selective enrichment. After that, they were cultured in selective media and then confirmative biochemical and serological tests were performed. *Salmonella* was found in 6 samples (9.5%), four red meats and two poultry pastes. Serological tests confirmed that the group C and group D serotypes were respectively isolated from red meats and poultry pastes. The best way to prevent *Salmonella* food poisoning is to control *Salmonella* infection in mammals and birds, to control their feeds being *Salmonella* free, to cook foods completely in order to reach 70°C, to prevent post contamination and to educate food handlers. The control of *Salmonella* in poultry pastes, because of their use in different food products, like chicken burgers and sausages, is very important.

Key words: *Salmonella*, raw meats, contamination, control.

INTRODUCTION

Salmonella is found in the GI tract of most of the animals and it is capable of being transferred to the soil, water, food, and other animals through feces. *Salmonella* is one of the main food poisoning factors in the world and the most prevalent source of infection is chicken and products made of it. Purpose of this article is to analyze the existence of *Salmonella* in the food materials and its control methods. For this purpose, first, 25g sample is enriched under general and private process, and then they were cultivated in the specific media. Biochemical and serologic identification tests were examined on the suspicious colonies.

In 2004, 949 food materials were analyzed to find out the existence of *Salmonella* among which quantity, 22 samples (2.4 percent) were discovered to be infected with *Salmonella*. From 22 infected samples, 1 was related to crude vegetables, 2 samples to cooked vegetables, one sample to baked protein food, and 18 samples related to the crude protein foods. Among the crude protein materials, 10 samples were related to chicken paste. The maximum infection rate is related to the *Salmonella* Group C because 12 samples out of 22 infected samples (49%) were related to this group. Salmonella Group C is classified under I subtype with ability of causing infectious diseases.

The best way to prevent *Salmonella* food poisoning to control mammals and birds, to cook foods completely, to prevent post contamination, training and caretakers of food materials. Control of the chicken pastes for making sure of the nonexistence of *Salmonella* in them is of much importance due to being used in different protein products.

Salmonella is known as one of the main food poisoning factors in the world. The principal food materials related with this bacterium is chicken and products made of it. In this study, 949 food materials were analyzed to discover the existence of *Salmonella* in them. Among them the higher infection rate is related to the crude protein materials especially to the chicken paste. The best way for removing this bacterium from the food materials is to control mammals and birds and poultry, to baking foods completely, avoiding the secondary pollution and training the cooking of food materials.

MATERIAL AND METHODS

First 25 g of the food material was added to 225ml broth with peptone broth and heated for 16-20 hours under the temperature of 35 ºC -37 ºC, and then 1ml of the each broth was transferred to the test tubes including 10ml Selenit Cystine Broth and tetrathionate broth. Test tubes were incubated respectively at the temperature of 35°C- 37°C, and 41.5°C for 18-24 hours and then the product was cultivated on *Salmonella*, *Shigella*, and Brilliant Green agars in a linear fashion. Plates were put under 35°C- 37°C temperature for 20-24 hours and then the following biochemical confirmation tests were applied on the suspicious colonies:

- Surface cultivation over beveled Simmon Citrate Agar
- Surface and deep cultivation in TSI (Triple Sugar Iron Agar) and LIA (Lysine Iron Agar)
- Deep cultivation in SIM8 agar
- Cultivation in broth MR_VP (Methyl Red-Voges Proskauer Broth)
- Cultivation in urea broth

Then the serological confirmation tests were applied on the doubtful colonies resulted from biochemical tests with the use of anti-serums of A, B, C, and D Groups.

RESULTS

From 949 tested food materials, 22 samples (2.4%) were infected with *Salmonella*. From 22 infected samples, 1 was related to crude vegetables, 2 samples to cooked vegetables, 1 sample to baked protein food, and 18 samples related to the crude protein foods. Among the crude protein materials, 10 samples related to chicken paste. The maximum infection rate is related to the *Salmonella* Group C such that from 12 samples out of 22 infected samples (49%) were related to this group. *Salmonella* Group C is put under I subtype and it is incapable of resulting to infection.

DISCUSSION

Salmonella is one of the members of antrobacteriaceae and is known as a pathogen. This bacterium is able to cause diseases in humankind and animals. Salmonella is able to grow in different environmental conditions (aerobic and non-aerobic conditions) and grows in an extended range of temperature (5-47 °C). In recent decades, we witnessed several outbreaks concerning different types of *Salmonella* especially *S. typhimurium* and Enteritidis Salmonella in different points of the world such that 90 percent of food poisonings in England is related to this bacterium.

In the current study, *Salmonella* infection is discovered in crude and baked vegetables and protein materials. Since most of the *Salmonella* are sensitive to temperature and usually die when incubated under pasteurization temperature, infection in baked food materials is because of secondary infections or due to insufficient baking. Infection is capable of being transferred from the surfaces and instruments contaminated with the crude protein materials to other food materials such as vegetables. Therefore, consideration of sanitary concerns in case of the surfaces and instruments contaminated with the crude food materials is of much importance.

Salmonella survives in under zero temperature. Therefore, for controlling this bacterium in crude protein materials it is important to avoid of post contamination, livestock, and poultry. For feeding chicken, hen-keepers use

protein complements that are achieved from the waste materials of slaughterhouses and mix them with the birdseeds. Some of the slaughterhouse waste materials are provided through the animals infected with *Salmonella.* When such materials are used by chicken, *Salmonella* is propagated in its GI tract and cause infection. Therefore, it is of much importance to control livestock and poultry foods and to make sure that there is no *Salmonella* in it. In the current study, the highest *Salmonella* infection in the crude food materials is related to the chicken paste in particular. Since the chicken paste may be used as the primary material of different protein products, it is important to control *Salmonella* in it and it is of much importance to control imports of such goods.

Sanitary and health materials are of much importance due to its consumptive importance and sensitivity. Since such materials are in a direct contact with skin, which is the preserver layer of body, the microbiological control of such materials has special position and role in insuring the health for the society. Increasing and extended use on one side and production of new products on the other side doubles the importance of using such materials. In this study, different types of cosmetic materials (lotions, powder lotions, lipstick, etc) as well as hygienic materials (facial tissue, tampons, napkins, ear cleaners, etc) produced in local country or abroad as well as samples gathered from different parts of Tehran were put under microbiology tests. This study with such sample volume was presented as the first scientific report of the country. Quantity of the tested samples has been equal to 140 samples in 2004 and 169 samples in 2005.

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